



Prophylactic Antibiotic Use in Surgery: What do the Data Say?

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Objectives

- ▶ Review the current antibiotic recommendations for prophylaxis in surgical patients
- ▶ Discuss current antibiotics available for prophylactic use as well as alternatives in allergic patients
- ▶ Be familiar with the continued use of antibiotics in post-surgical patients
- ▶ Recap/updates on endocarditis prophylaxis
- ▶ Take Home Points

Disclosures

▶ None

Definitions

- ▶ Prophylaxis
 - ▶ Administration of an antibiotic prior to contamination of previously sterile tissues or fluids
 - ▶ Use of antibiotics for dirty/contaminated procedures is not considered prophylaxis – this would be an established infection (ie perforated viscus)
- ▶ Presumptive therapy
 - ▶ Administration of an antibiotic when there is a strong possibility of infection
- ▶ Treatment
 - ▶ Administration of antibiotics when infection has been established

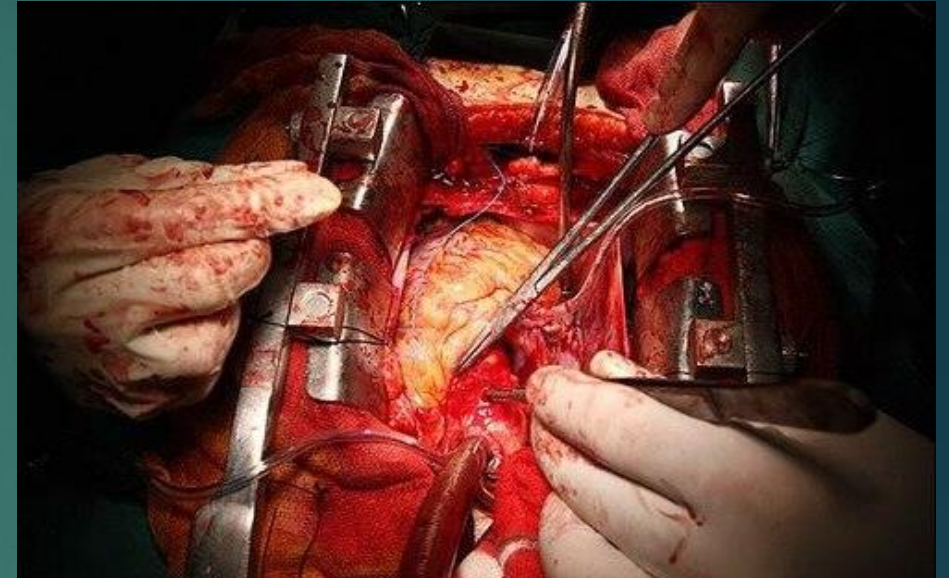
Goals of Antibiotic Prophylaxis

- ▶ Prevent surgical site infections
- ▶ Decrease post-op morbidity and mortality
- ▶ Reduce duration of stay and cost of healthcare
- ▶ Produce no adverse effects
- ▶ Minimize consequences for the microbiome of the patient/hospital
- ▶ To choose an antibiotic targeting the most likely pathogens
- ▶ Give adequate dosage and repeat the dosing if needed
- ▶ Administration for the shortest possible post-op period

Cardiac/Thoracic Surgerie

(Gram positives – *S. aureus*, CoNS, *Propionibacterium* most likely)

- ▶ CABG/Cardiac device insertion/VAD
 - ▶ Recommended: cefazolin, cefuroxime
 - ▶ Alternate: clindamycin, vancomycin
- ▶ Thoracic (lobectomy, pneumonectomy, lung resection, thoracotomy, VATS)
 - ▶ Recommended: cefazolin, ampicillin-sulbactam
 - ▶ Alternate: clindamycin, vancomycin
- ▶ Heart/lung transplant
 - ▶ Recommended: cefazolin
 - ▶ Alternate: clindamycin, vancomycin



GI Procedures

(Coliforms – E.coli, proteus, klebsiella most commonly), staph, strep, enterococcus, anaerobes

- ▶ Gastroduodenal (bariatric, pancreaticoduodenectomy, antireflux, vagotomy)
 - ▶ Recommended: cefazolin
 - ▶ Alternate: clindamycin or vancomycin + AG or aztreonam or FQ
- ▶ Biliary tract (open procedures)
 - ▶ Recommended: cefazolin, cefoxitin, ceftriaxone, ampicillin-sulbactam
 - ▶ Alternate: clindamycin or vancomycin + AG or aztreonam or FQ or metronidazole + AG or FQ
- ▶ Laparoscopic procedures
 - ▶ Low risk – NONE
 - ▶ High risk recommended: cefazolin, cefotetan, ceftriaxone, ampicillin-sulbactam
 - ▶ High risk alternate: clindamycin or vancomycin + AG or aztreonam or FQ or metronidazole + AG or FQ

GI Procedures Cont'd.

- ▶ Appendectomy
 - ▶ Recommended: cefoxitin, cefotetan, cefazolin + metronidazole
 - ▶ Alternate: clindamycin + AG or aztreonam or FQ or metronidazole + AG or FQ
- ▶ Small intestine/hernia
 - ▶ Recommended: cefazolin (+metronidazole or cefoxitin or cefotetan if obstructed)
 - ▶ Alternate: clindamycin + AG or aztreonam or FQ + vanco if mesh
- ▶ Colorectal surgery
 - ▶ Recommended: cefazolin + metronidazole, cefoxitin, ampicillin-sulbactam, ceftriaxone + metronidazole, ertapenem
 - ▶ Alternate: clindamycin + AG or aztreonam or FQ or metronidazole + AG or FQ

Orthopedic surgeries

(Skin flora – *S aureus*, GNRs, CoNS, B-hemolytic strep)

- ▶ Clean operations, spinal procedures, hip fractures, implants, joints
 - ▶ Recommended: cefazolin
 - ▶ Alternate: clindamycin, vancomycin



Urologic/Gynecologic Surgery

(E. coli, other GNRs, enterococcus)

- ▶ Lower tract instrumentation
 - ▶ Recommended: FQ, trimethoprim-sulfa, cefazolin
 - ▶ Alternate: AG with or without clindamycin
- ▶ Clean without entry into urinary tract
 - ▶ Recommended: cefazolin (+AG if prosthetic material)
 - ▶ Alternate: clindamycin, vancomycin
- ▶ Clean with entry into urinary tract
 - ▶ Recommended: cefazolin (+AG if prosthetic material)
 - ▶ Alternate: FQ, AG with or without clindamycin
- ▶ Cesarean section
 - ▶ Recommended: cefazolin
 - ▶ Alternate: clindamycin + AG
- ▶ Hysterectomy
 - ▶ Recommended: cefazolin, cefotetan, cefoxitin, ampicillin-sulbactam
 - ▶ Alternate: clindamycin or vancomycin + AG or aztreonam or FQ

Controversies/Failures

- ▶ Controversies
 - ▶ Selection of antibiotics
 - ▶ Duration of therapy post-procedure (and pre-procedure?)
 - ▶ Development of resistant organisms
 - ▶ Role of newer antibiotics
- ▶ Failure of prophylaxis?
 - ▶ Inadequate timing of antibiotic
 - ▶ Failure to re-administer antibiotic during prolonged surgical procedures

Patient Risk Factors

- ▶ Extremes of age
- ▶ Poor nutritional status
- ▶ Obesity
- ▶ Tobacco abuse
- ▶ Remote body site infections
- ▶ Immunocompromised
- ▶ Length of hospitalization
- ▶ Colonization with microorganisms



Development of Resistance

- ▶ MRSA
 - ▶ 49.2% of surgical wound infections
 - ▶ Also a concern for VRSE, VRSA with rising MICs
- ▶ Use of vancomycin prophylaxis is not routinely recommended for any procedure
 - ▶ Agent of choice when high rate of surgical site infections >20% in an institution involve MRSA or CoNS
- ▶ Universal MRSA screening remains controversial
 - ▶ MRSA decolonization pre-op?



Pre-op Screening and Decolonization

- ▶ Staph aureus causes 30% of all SSIs in the US
- ▶ Colonization with *S. aureus* in the nares in 1 in 4 patients
 - ▶ Those colonized have a 2- to 14-fold increase in risk of SSIs
- ▶ Data does support use of intranasal mupirocin to decrease the risk of SSIs in patients colonized with *S. aureus*
 - ▶ Most compelling data in cardiac and orthopedic patients
- ▶ Chlorhexadine baths + mupirocin protocol
 - ▶ One study found that deep SSIs (MSSA) occurred in 0.9% of treated group vs. 4.4% of placebo group
 - ▶ Superficial SSIs less marked
 - ▶ Timing of protocol?

Dosing

- ▶ Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery were updated in 2013 (previously updated in 1999) and have several key recommendations
 - ▶ Optimal time for administration of pre-op antibiotics is within 60min of the first surgical incision
 - ▶ Antibiotics with longer infusion times should be started within 120min
 - ▶ Updates on weight-based dosing and need for repeat dosing in prolonged procedures
 - ▶ If a procedure exceeds two half-lives of the drug or if excessive blood loss
 - ▶ Shortened postoperative course for continued administration of antibiotics

Redosing

- ▶ If a short-acting agent is used, antibiotic should be redosed if the procedure is >3 hours
 - ▶ Common short half-life agents include ampicillin-sulbactam, cefoxitin, ampicillin, cefazolin
- ▶ Consider redosing if prolonged or excessive bleeding, extensive burns
- ▶ If patient has renal failure or renal insufficiency, redosing is generally not warranted



Duration Post-Procedure?

- ▶ For most procedures – continuation of therapy for 24 hours or less
- ▶ Cardiac/cardiothoracic – up to 48 hours
- ▶ No data to support the continuation of antimicrobial prophylaxis until removal of drains, catheters, invasive lines are removed



Irrigation? Topical antibiotics?

- ▶ Topical antibiotics are usually only routinely used in ophthalmic procedures
 - ▶ Some studies regarding “painting” the chest of cardiac patients with vancomycin/gentamicin – data is limited, no significant benefit noted thus far
- ▶ Limited data on the use of topical/irrigating/wash antibiotics



Endocarditis Prophylaxis

- ▶ Procedures with considerable risk for bacteremia increase the risk of endocarditis in some patients
 - ▶ Patients with artificial heart valves
 - ▶ Patients who have had heart repairs using prosthetic materials (not for coronary artery stents)
 - ▶ Prior history of endocarditis
 - ▶ Congenital heart defects (unrepaired or incompletely repaired)
 - ▶ Heart transplant patients with valvular disease
- ▶ NOT recommended patients with aortic or mitral valve disease or in patients with hypertrophic cardiomyopathy
- ▶ NOT recommended in patients with orthopedic implants!

Which Procedures?

- ▶ Dental procedures involving deep manipulation of the gums, root canals, tooth extractions
 - ▶ NOT for routine dental cleanings
- ▶ Procedures involving the upper respiratory tract
- ▶ Procedures involving obvious tissue infection
- ▶ NOT recommended for routine GI or GU procedures



Take Home Points

- ▶ The ideal timing for the first dose of antibiotics in the pre-operative period is within 60min of the first incision
 - ▶ Repeat dosing at 3 hours for antibiotics with short half lives
- ▶ Most perioperative IV antibiotics can be d/c within 24 hours of the procedure
 - ▶ No need to keep them going until all drains, tubes, lines removed as a rule
- ▶ Decolonization procedures are reasonable in patients with MRSA colonization in advance of upcoming procedures
- ▶ Endocarditis prophylaxis is NOT routinely recommended for atrial or mitral valve disease or in the presence of orthopedic implants



Questions?

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